

spondingly in the spectrum the sodium line was very reduced and little luminous; but the usual three bands of the hydrocarbons—yellow, green, and blue—were very conspicuous.

From October 1 to the present time the comet approached the form of Fig. 3, which I observed this morning; around the nucleus and very excentrically to the north, it is a faint envelope; at the top of the south edge a sort of horn issued; the north extremity is  $1^{\circ}$  distant from  $\alpha$  Hydræ. The length of the tail is  $17^{\circ}$ , the breadth  $2^{\circ} 48'$ .

The nucleus is much diminished and little luminous, and the colour of the comet almost white.

Besides the linear spectrum of the nucleus, the three bands of hydrocarbons extend  $5'$  round the nucleus.

The spectrum of the tail is continuous, and visible to the end.

It is remarkable that the changes of the spectrum (according to Dr. Hasselber's experiments) enabled me to predict that the comet had passed the perihelion before the orbit was calculated.

The beautiful sky of Palermo permitted me to observe the comet Cru's every day except October 5.

Observatory, Palermo, October 11 A. RICCO

### NOTES

WE regret that Sir E. J. Reed is confined to bed with severe gout, but are glad to learn, from inquiry last night, that his illness is not dangerous.

THE family of the late Prof. Balfour have presented his scientific library to the University of Cambridge, for the use of the morphological laboratory. It consists of rather more than 500 volumes, and 1100 pamphlets bound in 77 volumes. These include many most important original papers on morphology and embryology, which had been very carefully collected, and arranged according to subjects.

PROF. TACCHINI has recently visited London. We understand that he has been entrusted by the Italian Government with the arrangements for the Italian members of the expedition which will visit the Marquesas to observe the solar eclipse of May 6, 1883. Prof. Trépied, the director of the Observatory of Algiers, who also proposes to observe the eclipse, is now in this country.

WE understand that a new Lecture and Model Room has been appropriated in the Science School at South Kensington to the Metallurgical Department. But notwithstanding the great increase of the accommodation as compared with that formerly provided in Jermyn Street, the class is overflowing, several students having been unable to obtain admission.

ADMIRAL MOUCHEZ has decided to send MM. Henry, the well known astronomers, to the Pic-du-Midi Observatory, in order to report upon the practicability of establishing at this station (altitude 3200 metres) a permanent astronomical observatory. The investigation will extend over six weeks, and the two astronomers may possibly be detained by snow for a longer period.

THE installation of the set of magnetic instruments invented by M. Mascart has been completed, at Parc St. Maur Observatory, twelve miles from Paris. M. Theophile Moreau, one of the physicists of the Bureau Central, has been appointed to superintend the self-registering observations.

THE Conference on Electrical Measurement began its sittings on Monday at the French Foreign Office, under the provisional chairmanship of M. Duclerc, the Prime Minister, who delivered an address of welcome to the delegates and retired, when M. Cochery

was nominated President of the Commission. The delegates for arranging for the security of cables afterwards opened their sittings; the two Commissions will meet on alternate days. It is believed the Commission for Electrical Measurements will appoint a sectional committee to conduct the scientific investigation, and that the work of the Cables Committee will be of short duration. A letter was read from Sir William Thomson, excusing the delay in his arrival. He will be in Paris to-day, ready to act in either Congress.

A LETTER received from Mr. Henry O. Forbes, dated July 12 last, announces that he was expecting to be landed next day at Larat, the mainland of Timorlaut on the east side. From all accounts Mr. Forbes was inclined to believe that the natives would be well disposed, and that he would have no difficulty in making collections in this *terra incognita*, towards the exploration of which  $50\text{l.}$  was granted by the British Association at the Southampton meeting.

IN the neighbourhood of the Thuringian town of Kösen there are some disused saltworks with considerable water power. The latter is now to be utilised for the electric lighting of the town, and Kösen will thus be the first German town to introduce the electric light for illuminating the whole town.

THE foundation stone for a monument in memory of Columbus was laid at Barcelona on September 26.

LAST year an Anthropological Society was founded in Lyons, and the first number of its *Bulletin* lies before us. The Society works on much the same lines as the similar society of Paris. The *Bulletin* contains several good papers. Dr. Arloing writes on the influence of education in the development of the cranium of the dog; Dr. Lacassagne, on the progress of criminality in France, and also on the history of sepulture among different peoples; M. Paulet on sepulture among ancient and modern peoples; and M. Lacassagne on tattooing. The Paris publisher of the *Bulletin* is G. Masson.

A SHOCK of earthquake was felt at Panama at midnight, October 12-13. A rather smart shock preceded by thunder occurred on Thursday last on the south side of the Lake of Geneva, between Thonon and Douvaine, and a slighter yet very perceptible shock was felt at Geneva on Friday night. A very distinct shock of earthquake is reported to have been felt at the village of Comrie, Perthshire, on Saturday morning, about three o'clock, and was followed by another and more severe shock about half-past seven. The disturbance was accompanied by a sound resembling the distant booming of a cannon, and appeared to pass from the south-west to the north-east.

THE 6th part of Prof. Dodel Port's "Atlas der anatomischen und physiologischen Botanik" has recently appeared, and the work is thus approaching completion. The new part contains the usual six large coloured plates. They illustrate *Phaseolus coccineus*, L.; *Elodea canadensis*, Gaspary; *Erythrotis Baddomei*, Hooker f.; *Cuscuta glomerata*, Choisy; *Peziza*; and *Endocarpon pusillum*. Parts 6 and 7 of the same author's "Illustrirtes Pflanzenleben" has also just appeared. This work will be completed with Part 10.

HARTLEBEN'S "Chemisch-technische Bibliothek," of which some 100 volumes have now appeared, is no doubt known to many of our readers. This enterprising firm has now entered upon a similar undertaking, viz. an "Elektro-technische Bibliothek," of which the first volume, entitled "Die magnetelektrischen und dynamoelektrischen Maschinen," by Gustav Glaser-de Cew, has just appeared. The "Electro-technische Bibliothek" will, for the present, be completed in ten volumes. The following will be their contents:—Vol. II. The transfer of electric force; Vol. III. Lighting and heating by electricity; Vol. IV. Galvanic batteries; Vol. V. Telegraphy; Vol. VI. The tele

phone, microphone, and radiophone; Vol. VII. Galvanoplastics, electrolysis, and the preparation of pure metals; Vol. VIII. The electrical measure and precision-instruments; Vol. IX. The principles of electricity; Vol. X. Electrical formula.

THE encouraging results that were obtained in the way of optical communication between the frontiers of Morocco and the Spanish coast, a distance of about 300 km., have induced the idea of similarly connecting the islands of Mauritius and Réunion, and Mr. Adams (we learn from *Comptes Rendus*) is making preparations in Paris with that object. The principal station in Mauritius will be on the Plateau du Pouce, at an altitude of 750 m.; in Réunion, a spot has been selected near the lip of the crater of Nèfles, at 1130 m. The distance between the two stations is nearly 215 km. (say 134 miles). Mr. Adams is taking out two of Col. Mangin's large telescopic apparatus, with mirrors 0.60 m. in diameter. He means to use a so-called *automatic eclipser*, of the following arrangement:—A rule, with a number of equidistant holes in its upper surface, is moved along horizontally and regularly by a rack and pinion below. Pegs are inserted in certain of the holes, so as to produce long and short eclipses forming the letters of the Morse alphabet, by raising in turn a lever arm connected with a screen, which affects the telescopic apparatus. It is proposed to receive the luminous impression on a band prepared with gelatinobromide of silver, passed uniformly at the focus of the receiving telescope. From Col. Mangin's experiments it appears certain that a petroleum lamp with flat wick, viewed edgewise, will be sufficient for the signals in question. With this method of signalling, if successful, it will often be possible to telegraph to Réunion the approach of a cyclone, twenty-four to thirty-six hours before it has reached Mauritius.

THE Cambridge University Press will shortly publish an illustrated volume on "The Fossils and Palaeontological Affinities of the Neocomian Deposits of Upware and Brickhill," being the Sedgwick Prize Essay for the year 1879, by Walter Keeping, M.A., F.G.S. The "Lectures on Education" delivered before the University by Mr. J. G. Fitch, have now reached a fourth edition, which has lately been brought out at a reduced price for the use of teachers.

ON Sunday, the 8th inst., a large number of botanists in connection with the various natural history societies in the neighbourhood of Huddersfield, assembled at the Sun Inn, Highgate Lane, Lepton, and held a meeting specially for the display of the fungi of the district. The result of the day's hunt was arranged on tables in the large room, and the meeting being open to the general public, a large number of people assembled. Mr. Richard Jessop, president of the Lepton Botanical Society, was in the chair, and this gentleman gave a brief opening address. Messrs. A. Clarke and John Carter, of the Huddersfield Botanical Society, then named and described the fungi exhibited; these included the most known edible and poisonous species, and one plant of considerable botanical interest, viz. *Agaricus brevipes*, Bull. Several large dishes of fungi were then cooked by the landlady of the inn, and tested by the company: the flavour of each species being discussed and compared.

FOUR London Field Clubs, viz. the Hackney, Essex, Highbury, and Walthamstow Societies, visit Epping Forest in the neighbourhood of Chingford, on Saturday next, October 21, under the guidance of Dr. M. C. Cooke, Mr. Worthington G. Smith, Dr. H. L. Wharton, and Mr. J. English.

WE have received the first volume of the Spanish Cyclopædia, which is being brought out at Madrid by Mr. F. Gillman. It contains four extended treatises on Agriculture, Architecture, Anatomy, and Astronomy. The compilation appears to us to be done with care and conscientiousness, and the illustrations

are good and profuse. The printing is well done, and the whole undertaking is creditable to Mr. Gillman.

THE chemistry of saké-brewing is described in a long and interesting paper by Prof. R. W. Atkinson, published by the University of Tôkiô as No. 6 of the *Memoirs of their Science Department*. The consumption of saké in Japan amounts to about six gallons per head per annum. The preparation of this liquid may be regarded as taking place in three stages. (1) Preparation of *kôji*: rice is cleaned and the outer skin removed, it is then beaten or trodden with water, and lastly steamed; the embryo is thus killed and germination rendered impossible. The steamed rice is mixed with a little *tauc*, a yellowish powder, consisting of the spores of a fungus (*Eurotium oryzae*), and the mixture exposed on trays for several days, during which time the temperature of the surrounding air and also of the mixed rice and fungus spores rises very considerably. These operations are conducted in underground chambers cut off from the influences of the outer air. *Kôji* contains dextrose and dextrin, unaltered starch, mineral matter, and a diastase-like substance or substances; it converts cane-sugar partially into inverted sugar, and gelatinised starch into maltose, dextrose, and dextrin. (2) Preparation of *moto*: steamed rice, *kôji*, and water are mixed and maintained at a low temperature (0°–10°) for some time; the starch of the rice is thus for the most part changed into dextrose and dextrin. (3) Fermentation: the *moto* is heated by placing closed tubs of boiling water in the liquid; temperature rises, fermentation begins, and is continued for twelve or thirteen days by the introduction of fresh heaters; from time to time the mash is divided into portions, each of which is mixed with more *moto*, steamed rice, and *kôji*, and then fermented. The fermented liquid is filtered, cleared by standing, and heated in order to prevent it from souring. Saké does not keep for any length of time in warm weather, and must be repeatedly heated by the brewer. The sudden occurrence of fermentation when *moto*, rice, and *kôji* are heated is peculiar, as no ferment has been purposely added. Prof. Atkinson is inclined to regard the preparation of *moto* as being analogous to that of yeast in beer brewing; the ferment germs are being derived, he thinks, either from the air or from the grains of *kôji* employed in the first part of the process.

MESSRS. SAMPSON LOW, MARSTON, AND CO. are about to publish a cheap edition of the illustrated re-issue of Gilpin's "Forest Scenery," edited, with notes bringing it up to date, by Mr. F. G. Heath, author of "Autumnal Leaves."

IN an interesting article on printing in China, the *North China Herald* says that the first great promoter of the art of printing was Feng Ying Wang, who in 932 A.D. advised the Emperor to have the Confucian classics printed with wooden blocks engraved for the purpose. The first books were printed in a regular manner, and in pursuance of a decree in 953. The mariner's compass and rockets were invented about the same time, showing that at this period men's minds were much stirred towards invention. Twenty years after the edict the blocks of the classics were pronounced ready, and were put on sale. Large-sized editions, which were the only ones printed at first, were soon succeeded by pocket editions. The works printed under the Lung emperors at Hangchow were celebrated for their beauty; those of Western China came next, and those of Fokien last. Movable types of copper and lead were tried about the same time; but it was thought that mistakes were more numerous with them, and therefore the fixed blocks were prepared. Paper made from cotton was tried, but it was found so expensive that the bamboo-made paper held its ground. In the Sung dynasty the method was also tried of engraving on soft clay and afterwards hardening it by baking. The separate characters were not thicker than ordinary copper coins. Each of them was, in



fact, a seal. An iron plate was prepared with a facing of turpentine, wax, and the ashes of burnt paper. Over this was placed an iron frame, in which the clay types were set up until it was full. The whole was then sufficiently heated to melt the wax facing. An iron plate was placed above the types, making them perfectly level, the wax being just soft enough to allow the types to sink into it to the proper depth. This being done it would be possible to print several hundred or thousand copies with great rapidity. Two forms prepared in this way were ready for the pressman's use, so that when he had done with one he would proceed with another without delay. Here is undoubtedly the principle of the printing press of Europe, although western printers can dispense with a soft wax bed for types and can obtain a level surface without this device. Perhaps the need of capital to lay in a stock of types, the want of a good type-metal easily cut and sufficiently hard, and the superior beauty of the Chinese characters when carved in wood have prevented the wide employment of the movable types which are so convenient for all alphabetic writing. The inventor of this mode of printing in movable types five centuries before they were invented in Europe was named Pi Sheng.

THE manner in which the Chinese Government render the popular deities subservient to political ends has been noticed by Sir Alfred Lyall in a paper in the *Fortnightly Review* in the beginning of the present year. In a recent *Peking Gazette* we find an instance of how a deity is raised in rank for presumed public services. The military governor of Urumtsi prays the Emperor to confer a tablet on the deities of a mountain in his district, in recognition of various acts of supernatural interposition. In this mountain there is a large lake of unfathomable depth, upon the waters of which the inhabitants of the whole surrounding country rely for the irrigation of their lands. Of recent years, however, it appears the springs had shown signs of exhaustion, and much anxiety has been felt on this account. Last year a temple, dedicated to the divinities of the mountain, was erected, and scarcely had it been completed when the water in the lake rose more than a hundred feet, and has ever since afforded an unfailing supply of water. The assistance of these deities has been invoked with unvarying success on many occasions when locusts threatened to devastate the country, or when snow was urgently needed for the protection of the crops. The memorialist thinks that important services such as these should not go unrequited, and he begs therefore, in accordance with the expressed wish of the inhabitants, to address the Emperor on the subject. His Majesty replies graciously conferring the suggested tablet on mountain divinities.

THE Vienna municipal authorities have established a number of regulations for persons wishing to manœuvre a balloon. They are obliged to prove that they have gone through a course of instruction with a competent aéronaut, and have executed by themselves a number of successful ascents. Persons desirous to be passengers in a balloon are obliged to procure an authorisation from their wife and children, if any.

THE additions to the Zoological Society's Gardens during the past week include two Macaque Monkeys (*Macacus cynomolgus* ♀ ♀) from India, presented by Mr. A. Cornet; a Common Paradoxure (*Paradoxurus typus*) from India, presented by Sir Louis S. Jackson, F.Z.S.; a Golden Eagle (*Aquila chrysaetos*) from Hudson's Bay, presented by Capt. Hawes; five Delaland's Geckos (*Tarentola delalandii*), four Millipedes (*Yolus*, sp. inc.) from Teneriffe, two Sharp-headed Lizards (*Lacerta oxycephala*) from Madeira, presented by Mr. A. D. Bartlett; a Galeated Pentonyx (*Pelomedusa galeata*) from South Africa, presented by Mr. W. A. Watkins; two Black Wallabys (*Halmaturus ualabatus*) from New South Wales, a Dormouse Phalanger (*Dromicia nana*) from Tasmania, a Grand Eclectus (*Eclectus*

*grandis*) from Moluccas, a Red-sided Eclectus (*Eclectus polychlorus*) from New Guinea, purchased; a Rufous Rat Kangaroo (*Hypsiprymnus rufescens* ♂), a Squirrel-like Phalanger (*Belidens sciureus* ♀), born in the Gardens.

### OUR ASTRONOMICAL COLUMN

THE OBSERVATORY AT CHICAGO.—We have received from Professor G. W. Hough his annual report as director of the Dearborn Observatory at Chicago, for the year 1882. It is mainly devoted to the reduction and discussion of the numerous series of observations on the spots upon the disc of the planet Jupiter, made with the 18½-inch refractor, including measures for position of the great red spot, of equatorial white spots and other markings, and angles of position of the equatorial belt. The observations extend over the period from September, 1879, to March, 1882. Those made in 1879 and 1880 showed that the red spot was retrograding with accelerated velocity, and this drifting has continued with such uniformity, that Prof. Hough considers "the position of the spot at any future period can be very accurately computed." It was found that all the observations could be fairly represented by a period of rotation, varying directly with the time, and the discussion leads to the following formula:—

$$1879, \text{ September } 25 + t \times 0.00209s.,$$

which gives 9h. 55m. 35.9s. for the mean period between September 25, 1879, and March 29, 1882, comprising 916 days, or 2214 rotations of the planet.

Hence it is inferred that the apparent rotation-period has increased about four seconds since the opposition of 1879, showing a total drift of the red spot in longitude of 40,000 miles; and Prof. Hough regards his observations as evidence that the great red spot is not the solid portion of the planet. "An immense floating island," nearly 30,000 miles in length, and more than 8000 in breadth, has "maintained its shape and size, without material change, during more than three years." He has failed to recognise any fading of the colour of the spot, which on February 2 in the present year he judged to be a light pink, as formerly. Although the dimensions of the spot may not be said to have materially changed, the micrometrical measures do indicate a diminution in length to the extent of 0".95 between the oppositions of 1879 and 1881, at which latter epoch it was 11".30 (reduced to Jupiter's mean distance).

The direction of the south edge of the equatorial belt was nearly parallel with the planet's equator, as given in Marth's ephemeris; the north edge of this belt was found to be slightly concave.

The elliptical white spots were more numerous in 1882 than previously; but with the exception of two situate south of the red spot, they were seen with difficulty, and were only measurable under best vision. The two spots named were observed systematically during the three months from November 21, 1881, to February 23, 1882. The following of the two appeared to be at rest relatively to the red spot from November 22 to December 6, and subsequently to drift in the direction of rotation to the extent of about 41"; the average drift during the last two months was at the rate of fifteen miles per hour. The preceding spot also did not retain the same relative position in longitude with respect to the great red spot. Prof. Hough adds: "The observations of the small white spots during 1880 and 1881 prove that the whole surface of the planet outside the margin of the equatorial belt rotates with nearly the same rate." The approximate rotation-period for the principal white spot between the edges of the great equatorial belt was 9h. 50m. 9.8s. from observations over more than eight months, which is the same as for the second spot observed during 1880. Hence these equatorial white spots drift in the direction of the planet's rotation, at about 260 miles per hour, or through a complete revolution in about 45 days.

Twelve tinted drawings of the appearance of the disc of Jupiter accompany the report. The first of two made on July 3, 1880, shows the second satellite just entering on the great red spot at 15h. 43.5m., and the other, made nine minutes later, shows it nearly over its centre. A notch was formed so soon as the satellite touched the end of the red spot, and when completely entered, it appeared as white as when outside the planet's disc.

Mr. S. W. Burnham, who was at the Washburne Observatory